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EXAMINER

BUEKER, RICHARD R

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1763

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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Paper No. 28

Application Number: 09/161,520
Filing Date: September 29, 1998
Appellant(s): SATO, JUNICHI

Ronald P. Kananen
For Appellant

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EXAMINER'S ANSWER

This is in response to the appeal brief filed July 23, 2002.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

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(3) Status of Claims

The statement of the status of the claims contained in the brief is correct. The amendment after final filed July 23, 2002, amending claims 12 and 16, has been entered.

(5) Summary of Invention

The summary of invention contained in the brief is correct.

(7) Grouping of Claims

The appellant's statement in the brief that certain claims do not stand or fall together is not agreed with, to the extent that claim 14 and claim 20 are said to each stand or fall alone. Claims 12-14 stand or fall together with respect to the rejection over Cote in view of Wang. As noted in this rejection, dependent claim 14 recites method steps of forming boehmite particles, but these method steps should be considered as a "product-by-process" type limitation, as also discussed in the rejection. Therefore, claim 14 stands or falls with claims 12-13.

Claims 16-20 stand or fall together with respect to the rejection over Wang in view of Krussell and Winebarger. Dependent claim 20 recites the same "product-by-process" type limitation as claim 14. Dependent claim 20 has the same relationship to claim 16, from which it depends, as dependent claim 14 has to claim 12, as discussed directly above. Therefore, claim 20 stands or falls with claims 16-19.

Claims 14, 20, 22 and 24-27 stand or fall together with respect to the rejection under 35 USC 112, first paragraph. All of these claims recite the step of adding sodium aluminate during the formation of boehmite particles, which step is argued in the

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rejection to be not properly enabled by applicant's specification. Therefore, all of claims 14, 20, 22 and 24-27 will stand or fall according to the Board's decision with respect to the stated enablement rejection.

It is noted also that the above groupings are in accordance with the groupings of the claims in the arguments set forth in appellant's brief.

(8) Claims Appealed

The copy of the appealed claims contained in the Appendix to the brief is correct.

(9) Prior Art of Record

4,956,313	Cote	9-1990
5,478,436	Winebarger	12-1995
5,693,239	Wang	12-1997
5,723,019	Krussell	3-1998

Wefers, K., "Oxides and Hydroxides of Aluminum", Alcoa Technical Paper No. 19, Revised, Alcoa Labs, (1987).

(10) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

The rejection of claims 12-14 based on Yamada has been removed in view of the entry of the amendment after final.

Claims 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cote in view of Wang. Cote discloses a chemical-mechanical polishing (CMP) process in which an alkaline alumina slurry (see col. 5, lines 37-39 of Cote) is used to planarize a tungsten coated wafer. Cote does not discuss the use of boehmite. Wang also

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discloses a CMP polishing process in which an alumina containing slurry is used to planarize a tungsten coated wafer. Wang teaches that it is desirable to substitute a form of alumina that is less abrasive than alpha-alumina for up to 99% of the abrasive particles in the slurry. It is noted that Al_2O_3 is known as alpha-alumina. At col. 4, lines 35-40, Wang teaches that boehmite is one of his preferred forms of less abrasive alumina. See also col. 4, lines 26-34 of Wang. Claim 12, as amended in the amendment after final filed July 23, 2002, adds the limitation that all of the abrasive particles in the abrasive particles slurry consist of boehmite. At col. 5, lines 3-55, Wang describes a series of six tests that he performed, using different ratios of alpha-alumina to less abrasive alumina. Test no. 1 of this series of tests was conducted with no alpha-alumina, which is to say that the abrasive particles in the slurry consisted of the less abrasive alumina. The results of test no. 1 clearly show that a slurry that consists only of the less abrasive alumina can successfully be used as a polishing slurry. For this reason, it would have been prima facie obvious to use a slurry that consists of one of the less abrasive aluminas taught by Wang. Also, Wang at col. 4, lines 12-16, and col. 5, lines 49-51, teaches that the highest value of selectivity (i.e. selectively polishing tungsten faster than SiO_2 , which is a desirable quality for planarizing) was achieved in test no. 1, with the slurry that consisted of the less abrasive alumina. Therefore, it would have been obvious to use a slurry consisting of the preferred less abrasive alumina to achieve the highest selectivity. It is noted again that Wang, at col. 4, lines 35-40, specifies boehmite in particular as one of his preferred less abrasive aluminas.

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Regarding claims 13 and 14, it is noted that claims 12-14 are drawn to a method of using a slurry which contains boehmite. The language of claims 13 and 14 recite how the boehmite was made, and these limitations are in the nature of a product-by-process limitation. A product-by-product limitation is treated as described in MPEP 2113. As indicated therein, a product-by-process limitation does not exclude other products made by other processes, if the products themselves are prima facie not distinguishable from the claimed product by process. Therefore, the boehmite described in claims 13 and 14 do not distinguish over the boehmite of Wang.

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cote in view of Wang taken in further view of Wefers (Alcoa Technical Paper). If, for argument's sake, claim 13 were considered to require boehmite particles produced by dipping aluminum in hot water, such would still be prima facie obvious in view of the teachings of Wefers. Wefers teaches (page 15, lines 31-34) that boehmite can be formed by treating aluminum with hot water, and it would have been prima facie obvious to use boehmite formed by this method in the process taught by Wang.

Claims 16-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang in view of Krussell (5,723,019) and Winebarger (5,478,436). Wang discloses a CMP process for planarizing a film on a semiconductor wafer by polishing with a slurry that contains boehmite abrasive particles. Wang does not discuss the step of removing the slurry after the polishing step is finished. Both Krussell (col. 4, lines 35-39) and Winebarger (col. 1, lines 38-42 and 62-65) teach the step of cleaning a wafer after CMP to remove the contaminants left by the CMP process. Krussell teaches a process of

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centrifugal (spin) cleaning (col. 2, lines 15-17), and it would have been prima facie obvious to one skilled in the art to spin clean the wafer of Wang, in view of Krussell. It is noted that Krussell also teaches brush cleaning and Fig. 1 of Krussell shows that the brushes are adapted to rotate (spin) which reads on applicant's "spin cleaner". Krussell (col. 1, lines 50-65 and col. 6, lines 61-65) and Winebarger (col. 1, lines 62-65) teach that the rinsing agents used by appellant are commonly known in the art to be compatible with cleaning a CMP processed wafer. It would have been prima facie obvious to one skilled in the art to use such known rinsing agents to clean the wafer of Wang after CMP.

Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wang in view of Krussell and Winebarger, taken in further view of Wefers. If, for argument's sake, claim 13 were considered to require boehmite particles produced by dipping aluminum in hot water, such would still be prima facie obvious in view of the teachings of Wefers. Wefers teaches (page 15, lines 31-34) that boehmite can be formed by treating aluminum with hot water, and it would have been prima facie obvious to use boehmite formed by this method in the process taught by Wang.

Claims 14, 20 and 22, and 24-27 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The claimed recitation of adding sodium aluminate during the manufacture of boehmite is not properly enabled by the specification as originally filed. The specification at page 13, lines 15-16, states "it is

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effective to add sodium aluminate to the hot water, as needed". Applicant has failed to disclose how much sodium aluminate is to be added, under what conditions it is to be added, or why it is to be added. It is noted that Wefers teaches that boehmite can be manufactured by treating aluminum with hot water alone. Applicant has failed to disclose why or how the additional inclusion of sodium aluminate would differ from what is taught by Wefers.

(11) Response to Argument

In the amendment after final filed July 23, 2002, which has been entered, appellant amended claim 12 to recite that **all** of the abrasive particles in the abrasive particles slurry consist of boehmite. Also, claim 16 was amended to recite that all of the abrasive particles in the abrasive particles slurry consist essentially of boehmite.

In *In re Wilson*, 153 USPQ 740, it was held that it is prima facie obvious to omit an additional element from a prior art composition, along with the additional element's function, when that function is not desired. In the present case, Wang at col. 3, lines 65-67 discloses the additional function provided by the presence of alpha-alumina, namely a high removal rate and low rate selectivity relative to the bond layer. According to *In re Wilson* noted above, it is a prima facie obvious matter of choice to delete the 1% alpha-alumina disclosed by Wang, along with its function described by Wang.

Appellant has argued that Wang's tests show that when alpha-alumina concentration dropped below 1%, polishing properties became "substantially worse". It is noted that Wang's tests show that when alpha-alumina concentration dropped below 1%, the polishing rate became slower, and the polishing selectivity became greater

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(which is desirable). As noted in the discussion of *In re Wilson* above, it is prima facie obvious to delete the 1% of alpha-alumina desired by Wang, along with its function, which is a higher polishing rate. It is clear from Wang's disclosure that 100% boehmite will still function as a polishing composition. Also, the higher selectivity resulting from deleting all alpha-alumina is a positive characteristic, and provides motivation for using an alpha-alumina free slurry.

Regarding claim 16, MPEP 2111.03 explains that the phrase "consisting essentially of" limits the scope of a claim to the specified materials or steps "and those that do not materially affect the basic and novel characteristic(s)" of the invention (emphasis in original). The basic and novel characteristic of applicant's invention is set forth on page 14, lines 8-21, where it is stated that "(t)he present invention thus makes it possible to realize a polishing rate higher than that obtained in the related art using the silica base slurry". Appellant teaches (page 13, lines 11-12 of the specification) that this basic and novel characteristic is achieved by using "abrasive particles mainly made of boehmite". Wang teaches the use of abrasive particles of up to 99% boehmite and 1% alpha-alumina. Wang also teaches (col. 2, lines 26-27) that alpha-aluminum oxide is more abrasive than boehmite. Therefore, it appears clear that using 1% alpha-alumina with 99% boehmite would increase the polishing rate compared to 100% boehmite, and would thus not materially affect the basic and novel features of applicant's invention, which is to provide a polishing rate higher than silica.

Further regarding the recited "consisting essentially of" language of claim 16, applicant has argued that "Wang slurries include submicron alpha-alumina particles as

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an essential and inventive component" (emphasis in original). It is true that Wang discloses that the presence of at least 1% alpha-alumina is an essential part of **Wang's** invention. Omission of the at least 1% alpha-alumina would, therefore, affect the basic and novel characteristics of **Wang's** invention, but that fact does not mean that the presence of 1% alpha alumina would materially affect the basic and novel characteristics of **appellant's** invention. As argued in the preceding paragraph, the basic and novel feature of appellant's invention, as described in appellant's specification, is a polishing rate higher than that of a silica slurry. Using 1% alpha-alumina with 99% boehmite would increase the polishing rate compared to 100% boehmite, and thus would not materially affect the basic and novel features of **appellant's** invention, which is to provide a polishing rate higher than that of silica.

Regarding the lack of enablement rejection, appellant has argued that one of ordinary skill in the art would recognize that the addition of another aluminum compound to a composition where abrasive boehmite particles are being formed would affect the solubility of the boehmite. It is noted, however, that there is no disclosure in appellant's specification and no evidence on the record to show that addition of sodium aluminate in the claimed manner would affect the solubility of boehmite. On the present record this appears to be merely speculation, and serves to illustrate how one skilled in the art could only speculate about the purpose of adding sodium aluminate in the manner claimed by appellant. Appellant has also argued that the total abrasiveness of the aluminum-type particles formed in the solution could be affected by the presence of sodium aluminate. This comment further illustrates the type of speculation one skilled in

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the art would have to engage in to try to understand appellant's cryptic disclosure at page 13, lines 15-16 of the specification.

Appellant has also argued that it would not constitute undue experimentation to determine by trial what amount of sodium aluminate should be used to obtain desired characteristics such as total aluminum particle abrasiveness and solubility of the boehmite. It is noted, however, that since the specification fails to state the purpose of adding sodium aluminate, one skilled in the art would not know what property to measure when trying various amounts of sodium aluminate. On the present record, it is only speculation to say that sodium aluminate affects aluminum particle abrasiveness or boehmite solubility.

For the above reasons, it is believed that the rejections should be sustained.

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Respectfully submitted,

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September 25, 2002

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